

## REMARKS

This application is a continuation of Application No. 09/421,621, filed October 19, 1999 (now abandoned). This Supplemental Preliminary Amendment is submitted in order to advance the prosecution by way of further response to the final Office Action dated July 17, 2001 (Paper No. 6) in the parent application. The specification has been amended to correct misspelled words and typographical mistakes.

Claims 36-55 have been canceled. New Claims 58-69 have been added to more clearly define the invention. In independent Claim 58, support for the recitation in step (b) of a stable positive surface charge in the range of about +1 mV to +100 mV (as determined by the zeta potential measurement) is found in the specification at page 4, line 7. Support for the recitation in step (d) of mixing the pulp furnish to uniformly distribute the modified starch particles in the furnish is found in the specification at page 15, line 26 and at page 16 in Table 8. Support for the recitation in step (e) that the modified starch is uniformly distributed in the paper product is the necessary result of performing of step (d).

### The Rejection of Claims 1, 2, 8-10, 26, 27, 35-37, 46, 47, and 55

#### Under 35 U.S.C. §§ 102(a)(b)/103(a)

In the final Office Action dated July 17, 2001 (Paper No. 6) in the parent application, Claims 1, 2, 8-10, 26, 27, 35-37, 46, 47, and 55 were rejected under 35 U.S.C. §§ 102(a)(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Brucato (U.S. Patent No. 4,609,432) or Pruszynski (U.S. Patent No. 5,942,087). Claims 36, 37, 46, 47, and 55 have been canceled. Applicants respectfully submit that Claims 1, 2, 8-10, 26, 27, and 35 and new Claims 58-69 are patentable over the teachings of Brucato and Pruszynski for the following reasons.

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The Teachings of the Brucato Reference. The Brucato reference teaches a method of making paper having improved tearing strength. The reference states:

Broadly speaking, in accordance with the present invention, a greater tearing strength is achieved by . . . introducing some fiber bonds of a different strength from those usually in the paper, by distributing such bonds non-uniformly, and by introducing some fibers that are unlike those usually in the paper. (Column 1, lines 54-60, emphasis added.)

The reference further teaches:

In accordance with the present invention, a relatively coarse fiber network is caused to be interposed within and bonded to the normal relatively fine fiber network of the paper so that the random fiber distribution is uniform on a macroscale but is non-uniform on a microscale . . . the effect of this non-uniform distribution on a microscale is to increase the tearing strength or resistance to internal tear. (Column 2, lines 52-61, emphasis added.)

Thus, the thrust of the teaching of the Brucato reference is to prepare a paper product having a relatively fine network of a "principal fiber" and a relatively coarse network of an "added fiber" non-uniformly distributed on a microscale within the network of the principal fiber in order to achieve better tearing strength. The bonding agent in the added fiber component is uncooked starch that is admixed or coated with a cationic material capable of causing the starch to adhere to the added fiber component.

The Present Invention is Patentable Over the Teachings of the Brucato Reference. In contrast to the express teachings of Brucato, the present invention provides a method of making a paper product having uniformly-distributed modified starch particles contained therein which exhibits an increased retention of the modified starch particles. Furthermore, the present

invention does not involve the use of a "principal fiber" and an "added fiber" as in Brucato. The result of the present inventive process is a paper product having modified starch particles uniformly distributed therein and exhibiting at least about 60% retention of the modified starch particles.

Thus, the present method and paper product are not taught or suggested by the teachings of Brucato. Accordingly, applicants respectfully request withdrawal of this rejection based on Brucato.

The Teachings of the Pruszynski Reference. The Pruszynski reference teaches a process for manufacturing paper and paperboard that includes the steps of preflocculating granular starch with an aqueous solution containing cellulosic fibers and a flocculant and then introducing the preflocculated mixture to either the white water, thick stock, or thin stock. By preflocculating the starch in the presence of cellulosic fibers, the Pruszynski reference describes achieving improved formation without compromising retention of the starch in the formed mat.

It is instructive to note the reference's discussion of the distinction between coagulants and flocculants. The Pruszynski reference states:

Coagulants are low molecular weight cationic synthetic polymers or cationic starches that are added to the stock. Coagulants generally reduce the negative surface charges present on granular starch particles and other particles in the stock and accomplish a degree of agglomeration of these particles.

Flocculants, on the other hand, are generally high molecular weight synthetic polymers operating via a bridging mechanism which creates larger agglomerates. The resulting agglomerates are then more easily entrapped in the formed web and therefore retention is improved. (Column 1, lines 52-62.)

Thus, it is clear that the Pruszyński reference teaches the use of flocculants, which are high molecular weight synthetic polymers that operate via a bridging mechanism that creates large agglomerates of flocculated starch particles.

The Present Invention is Patentable Over the Teachings of the Pruszyński Reference. In the first Office Action dated January 4, 2001 (Paper No. 4) in the parent application, the Examiner took the position that Example 3 of Pruszyński (a comparative example) anticipated or rendered obvious the present invention.

To demonstrate the differences between the teachings of Example 3 of the Pruszyński reference and the present invention, applicants enclose herewith the 37 C.F.R. § 1.132 declaration of Sherry Thomson. Ms. Thomson's declaration provides a comparison of the particles of the invention and particles prepared in accordance with the teaching of the Pruszyński reference. Among other differences, the particles of the invention have a positive surface charge, while particles prepared according to the Pruszyński teaching have a negative surface charge.

As demonstrated by the test results in Table 1 of the declaration, the charged modified starch particles representative of the present invention are considerably smaller in size than the flocculated starch particles representative of the teachings of Example 3 in the Pruszyński reference. Furthermore, as shown in Table 2 of the declaration, the modified starch particles representative of the teachings of the present invention exhibit stable and high magnitude positive charges whereas the flocculated starch particles representative of Example 3 of the Pruszyński reference exhibit unstable and low magnitude charges.

Thus, it is clear from Ms. Thomson's declaration that the charged modified starch particles representative of the present invention are considerably smaller in size than the flocculated starch particles representative of the teachings of Example 3 in the Pruszyński reference. Furthermore, it is clear from Ms. Thomson's declaration that the modified starch

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particles representative of the teachings of the present invention exhibit stable and high magnitude positive charges whereas the flocculated starch particles representative of Example 3 of the Pruszynski reference exhibit unstable and low magnitude charges.

Thus, the present method and paper product are not taught or suggested by the teachings of Pruszynski. Accordingly, applicants respectfully request withdrawal of this rejection based on Pruszynski.

The Rejection of Claims 3, 4, 11, 28, and 48 Under 35 U.S.C. § 102(a) or 35 U.S.C. § 103(a)

In the final Office Action dated July 17, 2001 (Paper No. 6) in the parent application, Claims 3, 4, 11, 28, and 48 were rejected under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a), as obvious over Pruszynski (U.S. Patent No. 5,942,087). Claims 48 has been canceled.

For the reasons discussed above, applicants respectfully submit that the subject matter of Claims 3, 4, 11, and 28 and new Claims 58-69 is not taught or suggested by the teachings of the Pruszynski reference. Accordingly, applicants respectfully request withdrawal of this rejection based on the Pruszynski reference.

The Rejection of Claims 3-7, 11-25, 28-34, 38-45, and 48-54 Under 35 U.S.C. § 103(a)

In the final Office Action dated July 17, 2001 (Paper No. 6) in the parent application, Claims 3-7, 11-25, 28-34, 38-45, and 48-54 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Brucato (U.S. Patent No. 4,609,432). Claims 38-45 and 48-54 have been canceled.

For the reasons discussed above, applicants respectfully submit that the subject matter of Claims 3-7, 11-25, and 28-34 and new Claims 58-69 is not taught or suggested by the teachings of the Brucato reference. Accordingly, applicants respectfully request withdrawal of this rejection based on the Brucato reference.

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Conclusion

In view of the above amendments and foregoing remarks, applicants believe that Claims 1-35 and 56-69 are in condition for allowance. If any issues remain that may be expeditiously addressed in a telephone interview, the Examiner is encouraged to telephone the undersigned at 206-695-1755.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE MAY 20, 2002

In the Specification:

The paragraph beginning at page 2, line 9, has been amended as follows:

However, by adding a surface charge to the raw starch particles, it is possible to dramatically increase starch retention in a web. Such increased starch retention is achieved through the use of retention aids that form a bridging attachment between the charged starch particles and fiber surfaces. Adding charge to raw starch has been previously accomplished by chemical modification of starch through the covalent attachment of certain functional groups, for example, quaternary amine groups, to the starch. In papermaking, these chemically modified starches are typically fully cooked and then added in the [papermachine's] paper machine's wet end. Such a chemical modification process adds considerable cost to the starch and, furthermore, does not result in a starch having sufficient surface charge to improve retention of [uncooked] cooked starch significantly beyond that of raw unmodified starch.

The paragraph beginning at page 2, line 26, has been amended as follows:

In one aspect, the present invention provides a modified polysaccharide having enhanced surface charge. The polysaccharide of the invention is a polysaccharide that has been modified to include a cationic polymer. The modified starch formed in accordance with the present invention has a surface charge from about +5 to about +20 mV. The modified polysaccharide can be [advantageous] advantageously incorporated into a papermaking furnish with enhanced retention.

The paragraph beginning at page 10, line 8, has been amended as follows:

Treatment with APAM had an insignificant effect on the appearance of fibers treated with either the cationic starch [and] or PQA-modified starch.

The paragraph beginning at page 10, line 13 has been amended as follows:

In this example, the measurement of the surface charge of representative starch particles having enhanced surface charge are described. The surface [charged] charge was determined by zeta potential measurement.

The paragraph beginning at page 13, line 20 has been amended as follows:

Britt Jar Conditions. A Britt Jar having a 100 mesh conical mesh screen was used in the retention determination. The pulp was added into a [vaned] tared Britt Jar with the stopper [close] closed and mixed with the starch at various speeds. After time had elapsed for sampling, the stopper was opened and the filtrate was collected in a tared aluminum pan (around 100 mL). The pan was immediately weighed on the same four-place balance that was used for the tare. The pan was put into a 105°C oven until the following day. The dried sample was placed into a desiccator before reweighing the pan. The consistency of the unretained slurry was calculated from Equation 1.

The paragraph beginning at page 14, line 21 has been amended as follows:

The above conditions were run at three different mixing speeds, 500, [100] 1000, and 1500 rpm, with the ultimate goal of obtaining realistic filler retention. Typical filler retention on a fine paper machine is between 50-55% retention. Table 7 provides the mixing speed results.

In the Abstract:

The paragraph beginning at page 29, line 4 has been amended as follows:

A modified polysaccharide having enhanced surface charge. The polysaccharide is modified to include a cationic polymer, preferably a polyquaternary amine, and has a surface charge from about +5 to about +20 mV. The modified polysaccharide can be [advantageous] advantageously incorporated into a papermaking furnish with enhanced retention.



In the Claims:

Claims 36-55 have been canceled.

Claims 58-69 have been added.